

while geology is represented by a geological hammer on some rocks in the foreground, and by a volcano in the distance.

The medal is to be awarded from time to time to persons who have made some notable contribution in connection with the zoology, botany, and geology of New Zealand; save in exceptional circumstances it is not to be awarded oftener than once in three years, and the recipient must have received the greater part of his education in New Zealand, or have resided in New Zealand for not less than ten years.

The remainder of the fund has been invested, and the interest on it may be used by the institute for making grants to persons who require assistance in connection with researches in New Zealand's natural history.

Communications with regard to the fund may be addressed to the secretary of the New Zealand Institute, Wellington, or to Dr. Chas. Chilton, Canterbury College, who acted as hon. treasurer until the fund was handed over to the institute.

#### W. H. HUDLESTON, F.R.S.

WE have to deplore the death, in his eighty-first year, of Wilfrid Hudleston Hudleston, one of the most distinguished of British geologists, whose combined knowledge of the main branches of the science, palæontological, stratigraphical, petrological and chemical, was unsurpassed.

Born at York, on June 2, 1828, he was the son of Dr. John Simpson, of Knaresborough (who married Elizabeth Ward, heiress of the Hudlestons of Cumberland), and he assumed the name of Hudleston, by letters patent, in 1867.

After receiving education in schools at York and Uppingham, he entered St. John's College, Cambridge, and graduated B.A. in 1850. His attention was directed to geology during his last term at college, when he was present at a course of Sedgwick's lectures, but some years elapsed before his interest was concentrated on that subject. The study of law had engrossed much of his time, and he was called to the Bar in 1853, but never practised.

Possessed of independent means, he spent the earlier years of manhood in travel in various parts of Europe and northern Africa. He was ever a keen sportsman, and the subject of ornithology attracted him, probably through his friendship with the late Alfred Newton, whom he accompanied on a visit to Lapland. Thus it was that he became one of the founders of the British Ornithologists' Union; and on December 9 of last year he attended a special meeting, held in the rooms of the Zoological Society, to celebrate the jubilee of the Union, when a gold medal was presented to him in honour of the occasion.

At the age of thirty-four, Mr. Hudleston decided to qualify himself for research work in natural science by courses of instruction which he undertook at Edinburgh, and afterwards at the Royal College of Chemistry in London. His ultimate career was determined in 1866, when he was introduced to John Morris, professor of geology in University College, London. An absorbing interest in geology was aroused by that enthusiastic and gifted teacher, and Mr. Hudleston became a Fellow of the Geological Society in 1867, and joined the Geologists' Association in 1871. To the latter body he gave energetic service for a number of years, being chosen honorary secretary in 1874, and president in 1881; and he conducted a number of notable excursions, his reports on which contain much original information.

The list of his geological publications commences in 1872, and among the more important are a series

of papers on the Yorkshire Oolites, and others on the Gasteropoda of the Oolites, published in the *Proceedings of the Geologists' Association* and in the *Geological Magazine*.

In 1877, in conjunction with the late J. F. Blake, he communicated to the Geological Society a memoir on "The Corallian Rocks of England," giving full particulars of these fossiliferous strata from Dorset to Yorkshire. It is sufficient to say that this paper is to be regarded as one of the geological classics.

In 1892, with the cooperation of the late Edward Wilson, he published "A Catalogue of British Jurassic Gasteropoda," a work embodying all the critical knowledge of the writers. His chief work, one on which he was engaged for more than twenty years, was his "Monograph on the Gasteropoda of the Inferior Oolite," published by the Palæontographical Society (1887-1896).

Mr. Hudleston, who served for several years as secretary of the Geological Society, was elected president in 1892; and he was awarded the Wollaston medal in 1897, soon after the completion of his great work on the Gasteropoda.

Apart from his detailed investigations, Mr. Hudleston was the author of numerous essays, which afford abundant evidence of his shrewd criticism and sound judgment, with not a little dry humour. Among these articles may be mentioned those on the geology of Palestine, on the Tanganyika problem, on the eastern margin of the North Atlantic Basin, on Indian geology, and on the geological history of iron ores.

Mr. Hudleston was elected a Fellow of the Royal Society in 1884. He was one of the founders of the Malacological Society, was president of Section C of the British Association at Bristol in 1898, and was president at times of several provincial natural history societies. In later years, when he acquired a country residence at West Holme, near Wareham, in Dorset, he took an active part in the proceedings of the Dorset Natural History Field Club. He investigated in detail the structure of Creechbarrow Hill, near Wareham, and only last year published an important paper on some well-sections in connection with the local water-supply. He died at his Dorset home on January 29. A biography of him, to which we are indebted for many of the above particulars, appeared in the *Geological Magazine* for September, 1904, accompanied by an excellent portrait and a list of publications.

H. B. W.

#### NOTES.

DR. HORACE T. BROWN, F.R.S., and Sir David Bruce, C.B., F.R.S., have been elected members of the Athenæum Club under the provisions of the rule which empowers the election of persons "of distinguished eminence in science, literature, the arts, or for public services."

WE learn from the *Pioneer Mail* that Sir T. H. Holland, F.R.S., director of the Geological Survey of India, may be expected to arrive in England on leave during the coming summer preparatory to retirement, as he proposes to accept the offer of the chair of geology at Manchester University vacated by Prof. Boyd Dawkins, F.R.S.

THE honorary secretaries of the meeting of the British Association to be held in Winnipeg from August 25 to September 1 of this year are Mr. C. N. Bell, Mr. W. Sanford Evans (Mayor), Prof. M. A. Parker, and Prof. Swale Vincent. The office of the secretaries has been organised in the University of Manitoba, Winnipeg, Canada.

SIR DANIEL MORRIS, K.C.M.G., late Imperial Commissioner of Agriculture for the West Indies, has been selected for the newly created office of scientific adviser to the Secretary of State for the Colonies on agricultural matters relating to British possessions in the tropics.

MR. R. R. TATLOCK has been elected president of the Society of Public Analysts for the ensuing year.

MR. O. J. R. HOWARTH has been appointed assistant secretary of the British Association in succession to Mr. A. Silva White, who recently resigned that office.

DR. F. H. HATCH has been appointed by the Government of Natal to make an examination of the mineral resources of the colony, and will shortly proceed to South Africa for that purpose.

A REUTER message from Messina states that a strong earthquake shock was felt there on February 7 at 9.30 p.m., followed by a slighter one half an hour later. Another shock of some violence occurred at 9 a.m. on February 8.

ON Thursday next, February 18, Dr. Hans Gadow, F.R.S., will begin a course of three lectures at the Royal Institution on "Problems of Geographical Distribution in Mexico." The Friday evening discourse on February 19 will be delivered by Sir Henry Cunynghame on "Recent Advances in Means of Saving Life in Coal Mines."

THE Turin Academy of Sciences, says *La Nature*, will award in 1911 a prize of 9300 francs, bequeathed by M. Bressa, to the man of science or the inventor of any nationality, who in the period 1907 to 1910 shall have made, in the judgment of the Turin Academy, the most distinguished and useful discovery, or have produced the most celebrated scientific work in some branch of science.

THE second meeting of the Spanish Association for the Advancement of Science, which was founded on the occasion of the Saragossa Exhibition, will be held at Valence next October. According to the *Revue scientifique*, two meetings will be held in 1910, one in Spain and the other at Toulouse. Particulars of the meetings may be obtained from M. Ricardo Garcia Merat, general secretary of the Royal Spanish Society of Sciences, at Madrid.

THE fifth meeting of the Prehistoric Congress of France will be held at Beauvais on July 26-31 next. The first three days will be devoted to the discussion of papers, and the remaining three to scientific excursions. An exhibition of prehistoric specimens will be held during the meeting. All information may be obtained from M. L. Giraux, the treasurer to the committee, 9 bis, avenue Victor-Hugo, à Saint-Mandé (Seine).

THE death is announced in *Science* of Prof. B. H. Guilbeau, professor of zoology at the Louisiana State University. Since 1906 Prof. Guilbeau had been director of the Gulf Biologic Station. In summer work at Cornell he investigated the froth production of the "spittle insects." At the time of his death he had been engaged for several months investigating the parasites of *Plusia brassica*, confirming the results of French investigators as to the development of many insects from a single egg.

THE gold medal of the Royal Astronomical Society has this year been awarded to Prof. O. Backlund, director of the observatory, Pulkowa, Russia, for his researches on Encke's comet. The medal will be presented at the annual general meeting of the society on Friday, February 12,

when the president, Mr. H. F. Newall, F.R.S., will give an address, setting forth the grounds upon which the award has been founded. The Jackson-Gwilt (bronze) medal and gift have been awarded to Mr. P. Melotte, for his discovery of the eighth satellite of Jupiter.

THE following have been elected as officers and council of the Royal Microscopical Society for the ensuing year:—*President*, Sir E. Ray Lankester, K.C.B., F.R.S.; *vice-presidents*, Mr. F. J. Cheshire, Rev. W. H. Dallinger, F.R.S., Sir Ford North, P.C., F.R.S., Mr. E. J. Spitta; *treasurer*, Mr. W. E. Baxter; *secretaries*, Dr. R. G. Hebb, Mr. J. W. Gordon; *ordinary members of council*, Mr. F. W. Watson Baker, Mr. A. N. Disney, Dr. J. W. H. Eyre, Mr. E. Heron-Allen, Mr. H. G. Plimmer, Mr. Thomas H. Powell, Mr. C. Price-Jones, Mr. P. E. Radley, Mr. Julius Rheinberg, Mr. C. F. Rousselet, Mr. F. Shillington Scales, and Mr. D. J. Scourfield.

ON Thursday, February 18, there will be a discussion at the Linnean Society on the subject of alternation of generations in plants. The discussion will be opened by Prof. W. H. Lang, who has just published an article, in the *New Phytologist* for January, on "A Theory of Alternation of Generations in Archegoniate Plants based upon Ontogeny." It is expected that Prof. F. O. Bower, F.R.S., Prof. J. Bretland Farmer, F.R.S., Prof. F. W. Oliver, F.R.S., Dr. D. H. Scott, F.R.S., and Mr. A. G. Tansley will be among those taking part in the discussion, which is likely to be of considerable interest, as the subject is of fundamental importance to botanical morphology, and is one on which botanists have hitherto taken very divergent views.

ONE of the most puzzling features of the reports of the Italian earthquake in the daily papers has been the absence of any news from the interior of Aspromonte. A correspondent to the *Hampshire Chronicle* fills this gap with an account of the medical expedition which was dispatched from Bologna; leaving the coast towns, this struck into the interior, and reached Oppido eight days after the earthquake, to find that they were the first, and only, relief expedition to reach the communes of Oppido, Scido, and Delianuova, where it was found that most of the houses had been destroyed and those still standing were uninhabitable. This district was one of the centres of destructive violence in 1783, and it is interesting to be able to add another to the many analogies between the earthquakes of that year and of 1908.

IN the issue of *NATURE* for April 20, 1905 (vol. lxxi., p. 595), an account was given of the work of Mr. J. B. Millet, of Boston, Massachusetts, on submarine signalling by sound, which he described at the annual spring meeting of that year of the Institution of Naval Architects. The recent wreck of the *Republic* and the subsequent events, in which use was made of the method, has brought submarine signalling prominently before the public, and it is suggested that the Government should supply our principal lightships with bells. It has been found that the bells can be heard usually at a distance of ten miles, and sometimes of twelve or fifteen miles. Ships fitted with a receiving apparatus can, by using the telephone receiver in the chart room in thick weather, pick up the sound from an ordinary bell-buoy which cannot be heard by the ear alone. We learn from an article in the *Times* that the lightships which already possess bells are the *Royal Sovereign*, *Tongue*, *East Goodwin*, and *Outer Dowsing*. Bells are about to be installed on the *Outer Gubbard*, *Shambles*, *Spurn*, and *Owers* lightships.

MR. QUARITCH has forwarded to us a copy of a catalogue of books on natural history, containing many rare volumes from the library of a naturalist and collector now abroad, and some herbals from that of the late Lord Amherst of Hackney.

COLOUR-VARIATION in some British slugs formed the subject of Mr. W. E. Collinge's presidential address to the Conchological Society in October last, the address, of which we have been favoured with a copy, being published in the *Journal of Conchology*. Colour-variations of a major and a minor type have long been known to occur in the two species forming the subject of the investigation, but the author is of opinion that even the better-marked variations are far less constant than has been hitherto supposed to be the case, while the minor ones are almost endless, and appear of little importance to the naturalist.

To Dr. E. Rey, of Leipzig, we are indebted for a separate copy of a preliminary paper from vol. xxxiv. of the *Ornithologischer Monatschrift*, in which are recorded the results of an examination of the contents of the stomachs of a number of insectivorous birds. The various insects (together with other invertebrates) found therein are tabulated according to their orders, and in the case of the beetles according to their families, those that are harmless being entered in one column and those that are injurious in a second, while such as come under neither of these headings are assigned a third column. The ultimate object of the investigation is to show to what extent insectivorous birds are beneficial to the agriculturist, but further examinations are essential before definite conclusions can be formulated.

BULLETIN No. 136 of the Bureau of Plant Industry of the U.S. Department of Agriculture is devoted to an article, by Mr. O. F. Cook, on methods and causes of evolution. The doctrine of evolution is now being made of practical use in the solution of problems connected with breeding and acclimatisation, and the paper is written to a great extent from this point of view. The author commits himself to the opinion that "evolution is not caused by the struggle for existence, nor limited to characters of environmental fitness. Harmless and even harmful characters may be acquired by species in the same way as beneficial adaptations." This is endorsed by Dr. A. G. Bell, who communicated the following comment quoted in the letter of transmittal:—"I, too, entertain the feeling that natural selection does not, and cannot, produce new species or varieties, or cause modifications of living organisms to come into existence. On the contrary, its sole function is to prevent evolution. In its action it is destructive merely, not constructive—causing death and extinction, not life and progression. Death cannot produce life; and though natural selection may cause the death of the unfit, it cannot produce the fit—far less evolve the fittest. It may permit the fit to survive by not killing them off if they are already in existence; but it does not bring them into existence or cause improvement in them after they have once appeared. We must look to other agencies for the causes of evolution."

THE tenth number, completing the volume for 1908, of the *Kew Bulletin* was issued last month. It contains determinations of new plants, chiefly from Africa and India, also a letter descriptive of a journey in the Nelson district of New Zealand, by Captain A. A. Dorrien-Smith. A note on the poisonous plant *Rhus toxicodendron*, that grows either as a shrub or a climber, is intended to remove the confusion, caused by recent inaccurate descriptions, between the leaves of this plant and of the harmless unrelated plant, *Ampelopsis Veitchii*.

IN the tenth (1908) number of the *Kew Bulletin* an article on the drug *cascara sagrada* furnished by the bark of two American plants, *Rhamnus Purshiana* and *Rhamnus californica*, is published with a view to the possible introduction of these trees into cultivation on the western coasts of the British Isles. The species *Purshiana* has made successful growth at Kew, and a chemical report on the bark pronounces the extract made from it to be indistinguishable from the product of American bark. There is a difficulty in getting fertile seed which has so far been imported, but where plantations are once formed coppice reproduction might be relied on, judging from the abundance of shoots produced from the stump of a tree cut down at Kew. *Rhamnus californica* is not recommended for cultivation in Great Britain.

FOR the inception of the new botanical publication, *Zeitschrift für Botanik*, that has been initiated in circumstances already explained in NATURE, the editors have been fortunate in securing an original article by Dr. H. Fitting on the effect of pollination and other influences on orchid flowers. The experiments carried out in Buitenzorg tend to show that post-floration changes are not the necessary consequence of pollination, although it normally provides the stimulus; thus, premature withering of the flowers and swelling of the gynostemium can be induced by smearing the stigma with dead pollen or an extract of pollen juice, although growth of the ovary does appear to depend upon the formation of the pollen-tube. The number, running to about 100 pages, contains also critical notices of recent publications, and an index to new literature arranged as in the *Botanisches Centralblatt*, which it resembles in form and appearance.

THE phytogeographical account of the littoral and alluvial districts of Belgium by Prof. J. Massart published in the seventh volume of the *Recueil de l'Institut botanique Léo Errera*, provides a remarkably comprehensive and attractive study of the conditions and associations existing there. The author discusses the past history of the region, the action of climate and soil, morphological modifications, the associations of plants, and the origin of the flora. A primary distinction is drawn between the clay soils of the estuaries and of the *polders*—the low-lying lands retained by the system of dykes—and the sandy soils of the dunes. The latter are bound with such typical species as *Ammophila arenaria*, *Carex arenaria*, and *Eryngium maritimum*, while *Salix repens* and *Hippophae rhamnoides* are dominant in the hollows. Occasionally plantations of alders or Scots pine are attempted, and in parts crops of potatoes and secale are raised. The nature of the associations is well shown in the photographs, which, with several charts and a list of plants, are published in a separate part. The flora differs from the northern littoral floras by the inclusion of calciphilous elements, and resembles the flora of the French littoral, with which it shares a southern origin.

WE learn from the *North British Agriculturalist* of January 21 that a new process for sterilising milk has been tried at Edinburgh under the superintendence of the inventor, Dr. Budde, of Copenhagen. It depends on the presence in milk of an enzyme, catalase, which decomposes hydrogen peroxide with liberation of oxygen. The milk is heated to 120° F., and treated with hydrogen peroxide; after a time the pathogenic organisms are destroyed, and the milk is run into sterilised bottles fitted with air-tight stoppers, and is then ready for delivery.

TEACHERS in agricultural schools and colleges will welcome the set of wall pictures recently issued by Messrs.



Macmillan and Co., Ltd., to illustrate various breeds of farm animals. Text-books containing sufficiently good illustrations to show what is wanted are too costly for class work, and photographs are not altogether suitable. These pictures are of a good size (30 inches by 20 inches), they depict good examples of the breed, and they are coloured. The set of six includes the thoroughbred horse, the Shire horse, the Shorthorn cow, the Ayrshire cow, Lincoln and Southdown sheep, Large White and Berkshire pigs.

THE *Journal of Agriculture of South Australia* for November, 1908, contains a short paper on the poisonous properties of the Cape tulip. Two species of this plant are found in South Australia, both imported from South Africa: *Homeria miniata*, the two-leaved Cape tulip, and *H. collina*, the one-leaved Cape tulip; the latter is the taller and handsomer, and is sometimes cultivated in gardens. The experiments recorded show that the plant is poisonous, but is carefully avoided by animals that regularly graze on land infested with it. There is some danger, however, that animals newly arrived and hungry may eat the plant, with serious consequences.

WE have received from Prof. Potter a copy of a paper recently published by him in the *Journal of Agricultural Science*, in which he suggests a method not hitherto tried for checking parasitic diseases in plants. It is well known that the waste products of metabolism, when permitted to accumulate beyond a certain stage, are inimical to the organism, gradually checking growth and producing results which finally prove fatal. By growing a pathogenic organism (*Pseudomonas destructans*) in a culture medium, he obtained a toxic solution which, on inoculation into a turnip suffering from the disease caused by this organism, completely inhibited further progress of the disease. The method promises to be distinctly useful in dealing with plant diseases.

MR. A. R. HORWOOD has embodied the results of an investigation, ranging over six years, of the fossil flora of the Leicestershire and south Derbyshire coalfield in a paper read before the Leicester Literary and Philosophical Society, and published in vol. xii., part ii., of the *Transactions*. The main object was to obtain evidence that would fix the position of the local Coal-measures in the British Carboniferous series. In the case of fossil plants such evidence is derived from the general collection rather than from any specific types. A few of the recorded species are rare, such as *Calamocladus lycopodioides* and *Neuropteris callosa*; also it is interesting to learn that Leicestershire provided the type of *Trigonocarpus Parkinsoni*, a seed that has been assigned to the group of fossil plants known as pteridosperms.

A CURIOUS instance of the light which may be thrown by anthropology on the system of Egyptian hieroglyphics is recorded by Mr. A. M. Blackman in the January issue of *Man*. The symbol representing the word *msy*, "to give birth," has been interpreted by Dr. Borchardt in the *Zeitschrift für Ägyptische Sprache* (December, 1907) to be derived from a fly-flap made of fox skins. Mr. Blackman has now found in Nubia that dead foxes are hung over the doors and on the roofs of houses as a charm to protect the women inmates from malignant influences at the time of childbirth. It follows, therefore, that the use of the symbol derived from a fly-flap was a secondary idea, the primitive conception on which it was based being its use as a birth amulet.

THE London County Council is doing useful work in popularising the study of anthropology by the issue of a series of guides to the collections in the Horniman Museum, Forest Hill. The last number, entitled "A Handbook to the Weapons of War and the Chase," is the work of Dr. H. S. Harrison, the curator of the museum, is edited by the advisory curator, Dr. A. C. Haddon, and is published at the modest price of twopence. After a short introduction dealing with the origin and primary characteristics of weapons, we have a series of articles describing the various types, of which those on clubs of various kinds, spear-throwers, and the composite bow may be specially commended. Unfortunately, only two plates are supplied. If the book were issued in a better form, with superior illustrations, it might be a useful addition to the library of the anthropologist.

THE *Journal of Hygiene* dated November last (viii., No. 5), though only just issued, contains an important paper by Miss Chick and Dr. Martin on the process of disinfection, in which a number of factors modifying the velocity of disinfection is discussed and the conditions necessary for determining the germicidal power of disinfectants and their standardisation detailed.

IN a report of the Board of Health, New South Wales, which has recently reached us, Dr. Ashburton Thompson gives details of an outbreak of plague (the seventh) at Sydney in 1907. Forty-seven cases occurred, of which sixteen ended fatally. For some years now the health staff has instituted a crusade against the rats, large numbers of the rodents being systematically destroyed, and a proportion of them examined bacteriologically. As in previous epidemics, numbers of the rats were found to be infected with plague during the epidemic period. In fact, the careful investigations of the Sydney Board of Health have demonstrated in successive epidemics the close connection that exists between plague in rats and plague in man.

THE subject of dangerous trades is one which has rightly attracted the attention of the public, and a hitherto unsuspected source of danger was recently brought to light in relation to the carriage and storage of the substance known as ferro-silicon. This material is manufactured by heating a mixture of iron ore, quartz, coke, and lime in an electric furnace, and is used by steel makers as a convenient method for the addition of silicon to certain grades of steel. A cargo of this material was being conveyed from Antwerp to Grimsby in December last, and five Russian immigrants in the steerage were found dead in the morning, their symptoms suggesting cholera. No suspicion of a dangerous cargo existed, and the necessary measures of precaution were taken by the Grimsby authorities. The viscera were sent to the laboratories of the Royal Institute of Public Health, and no true cholera organisms were discoverable. The subsequent investigations carried out by Dr. Dodd, Dr. Harris, and Prof. W. R. Smith at the laboratory seem to prove beyond question that death resulted from poisonous emanations from the ferro-silicon. When dry this substance emits no fumes, but when powdered and moistened fumes were formed, and proved fatal within a few hours to animals in the immediate neighbourhood. It was proved that arseniuretted hydrogen is produced in small quantities, but the chief gas evolved is phosphoretted hydrogen, a gas which is so poisonous that 0.02 per cent. of it in air is fatal to small animals within half an hour. Now that the source of danger is known, one can only hope that in the future suitable precautions will be taken to prevent the recurrence of fatalities similar to those which have led to the discovery of the danger.

THE Meteorological Office has recently published an English edition of the report of the meeting of the International Meteorological Committee at Paris in September, 1907. The consideration of the classification of meteorological stations, and of the definition in a clear and precise manner of the terms used for frozen aqueous vapour, referred to the committee by the conference at Innsbruck (1905), was postponed. Among the various subjects discussed we may mention a proposal of the Rev. L. Froc (Zi-ka-wei) for a system of signals for communicating to ships the information at present sent to sea-ports, &c. After a long discussion a special commission was appointed to report upon the question; the same commission was requested to report upon a proposal by Dr. Shaw for uniformity in the scale and projection of marine meteorological charts. After an exhaustive discussion of questions raised by Dr. Shaw and Mr. Nakamura relating to mean values of climatological data, the committee decided to request directors of meteorological systems to enumerate the publications containing such information for long periods for their countries. This resulted in the publication in the present report of a very valuable appendix giving references to such data. Special commissions were appointed to consider proposals for the publication of new isothermal charts (Prof. J. Hann) and daily weather reports for the whole globe (M. Teisserenc de Bort). Dr. Hellmann's proposal that a commission should be appointed to deal more especially with the question of wireless telegraphy was adopted. Dr. Shaw and Dr. Hellmann were respectively elected president and secretary of the International Committee in place of MM. Mascart and Hildebrandsson. Reports of commissions on terrestrial magnetism, aeronautics, and solar physics are printed in the appendices.

A PAPER on a practical method for the improvement of existing railway curves was read by Mr. W. H. Shortt at the Institution of Civil Engineers on January 12. The subject-matter comprises methods for the introduction of transition curves for connecting straight lines with circular curves, and also for connecting reversed curves at the reversal of curvature. The paper should be of service in pointing out the scarcity of such relieving curves on existing lines in this country, a defect which leads to damage of both line and rolling stock, and also contributes in no small degree to the discomfort of the travelling public.

THE claims of the propeller problem are advanced by Mr. J. Hamilton Gibson in an article on the efficiency of marine engines and propellers in the *Engineer* of January 29. The power developed by marine turbine machinery is measured by application of a torsionmeter, by means of which the angle of twist of a measured length of the propeller shaft is ascertained and taken as a measure of the torque passing through the shaft. The necessity of calibrating the shaft on which the instrument is to be used is shown from the results of experiments on apparently identical shafts, in which the value of the modulus of rigidity was found to vary from 11,500,000 lb. to 12,500,000 lb. per square inch, a variation which would introduce an error of nearly 9 per cent. had the same value of the modulus been assumed for all. Mr. Gibson has had great experience with torsionmeters, and makes some useful recommendations. Torsionmeter shafts should be periodically re-calibrated. The torque in turbine-driven shafts is found to be remarkably steady, consequently there is but small interference in the torsionmeter readings due to torsional oscillations of such shafts. Methods of obtaining the zero reading are described; this should be done at

the commencement of each trial. Data obtained from torsionmeter trials point to a marked inefficiency of the small high-speed turbine-driven propeller as compared with the large low-speed piston-driven screw, and Mr. Gibson suggests the need for a trustworthy thrust indicator which would indicate the amount of compression on the shaft, and thus enable turbine-driven propellers to be compared direct with piston-driven screws. Experiments on multiple-bladed propellers are also suggested, the analogy of modern windmills, fans such as the Sirocco, and many vaned water turbines being cited. Meanwhile, trial-trip data alone are available until some public-spirited firm takes upon itself the responsibility and cost of carrying out experiments on full-sized propellers.

THE *Physikalische Zeitschrift* for January 15 reproduces an address by Prof. M. Planck to the science students at the University of Leyden on the unity of natural philosophy, in which he dealt mainly with the recent tendencies of theoretical physics, and pointed out how marked had been the absorption by electrodynamics of branches of the subject formerly distinct. In his own field of work he dwelt at length on the greater precision which had been introduced into the study of thermodynamics by the reduction by the late Prof. Boltzmann of the idea of entropy to that of probability. From this, since the entropy of two independent systems is the sum of their separate entropies, while the probability of the two systems is the product of their separate probabilities, it follows that the entropy of a system is proportional to the logarithm of its probability. Finally, Prof. Planck pointed out the directions in which future advances will be made, and predicted much discussion of these fundamental questions, for, as he said, "theorists are many and paper is patient." He pleaded above all for conscientiousness in self-criticism and avoidance of personalities in the controversies which must arise.

WE have received from Messrs. W. and J. George a new simplified form of burette stand, which they designate the W.J. Burette Stand. It consists of a stout upright fastened to the usual form of base, both of which are of teak. The upright, of wood, has two permanently fixed arms, which are 9 inches apart. The arms are placed directly above each other, and are slotted so that a burette can easily pass into them. In order to hold the burette in position the wood at the sides of the slots is counter-sunk in the form of a ring about half-way down its thickness. To fix the burette in position two circular rubber bands are placed over it at such a distance apart that they will just rest upon the counter-sunk part of the arms. There are no screws to turn or get out of order, and by simply slipping the burette between the slots it falls into position without any further adjustment. For elementary students this is certainly a very simple stand, and one which cannot get out of order. The stand was invented and patented by the Rev. A. Wentworth Jones.

MESSRS. JAEGER AND VON STEINWEHR have recently completed at the Physikalisch-Technische Reichsanstalt, Charlottenburg, an exhaustive research on the silver voltameter, in connection with which comparisons of Weston normal cells have also been made (*Zeitschrift für Instrumentenkunde*, November and December, 1908). These two experimenters have arrived at the following conclusions:—(1) The weight of silver deposited in the voltameter does not, within the errors of experiment, depend on whether the Rayleigh form or the Richards modification is employed. The absolute measurements show a difference of 1 part in 10,000, but it was not possible to find a measurable difference in the exact relative measure-

ments. (2) By displacing the air during electrolysis with a neutral gas (nitrogen) no appreciable difference was observed in the weight of silver deposited; this is in agreement with the recent measurements made at the National Physical Laboratory, and contrary to the older measurements of most of the earlier observers. (3) The value found in the course of this research for the Weston normal cell, in terms of the international ohm and international ampere, agrees in a most satisfactory manner with the same results of the Reichsanstalt in 1908, and shows a satisfactory agreement with the recently published results of the National Physical Laboratory.

THE explanation of the electrical and thermal properties of metals as due to the existence of freely moving electrons in the intervals between the molecules of the metal has been a favourite theme with physicists for the last ten years since Prof. Riecke first published his theory. Although most of the theories have succeeded in giving properties for the metals in general agreement with the results of experiment, the quantitative agreement has not been all that could be desired. In particular, the quotient of the electrical and thermal conductivities, which has throughout been a favourite quantity with regard to which theory and experiment were compared, has, according to the theories, been a simpler function of the temperature than experiment has proved it to be. In No. 13 of the *Verhandlungen der deutschen physikalischen Gesellschaft* for 1908 Prof. P. Gruner, of Berne, suggests a modification of the theory of Prof. Lorentz which will do something to remove this objection. The negative electrons alone are supposed to be in motion, and when one impinges on a neutral molecule with sufficient velocity it is supposed to be capable of expelling an electron from the molecule, and when it impinges on a positive molecule with the requisite gentleness it may combine with the molecule. Since the critical velocities can be chosen at will, it is evident that Prof. Gruner's theory admits of a closer fit between theory and experiment than has hitherto been possible.

THE general report on the operations of the Survey of India administered under the Government of India during 1906-7 has been received. The report was prepared under the direction of Colonel F. B. Longe, R.E., Surveyor-General of India. We notice that the scale on which field surveys are to be executed and the larger scale standard maps published has been decided. The general scale of survey is to be 1 inch = 1 mile, but reserved forests and special areas will be surveyed on the scale 2 inches = 1 mile if required. The general scale for publication will be 1 inch = 1 mile. Among special observations carried out during the year under review may be mentioned those in connection with the gravimetric survey. The deflection of the plumb-line was determined at eleven stations in Káthiáwár and round the Gulf of Cambay, and the values obtained were in accordance with the general character of the deflections in Rajputana. Pendulum observations to determine the variation in the value of gravity were made at twelve stations in the neighbourhood of the Himalayas and of the Siwálik, and on or near the Great Arc. The general character of the variations found was in accordance with expectation, but local anomalies of considerable amount were also disclosed. The results obtained have been found to agree with those obtained by Prof. Hecker in 1905. The magnetic survey was extended during the year into Burma and Assam. The systematic observations of Himalayan peaks in connection with the problem of refraction were continued, and though the results are of

great interest many more are required before definite conclusions can be drawn. The total out-turn of detailed topographical and forest surveys on all scales was at the time of the report 25,740 square miles, against 23,312 square miles of similar surveys during the previous year. The total area triangulated and traversed for survey purposes was 31,851 and 1684 square miles respectively, against 27,134 for the previous year.

MESSRS. BOWES AND BOWES, of Cambridge, have just issued their latest catalogue of books on pure and applied mathematics, dealing more particularly with books published in the nineteenth century.

PROF. J. PERRY's well-known work on "Applied Mechanics" has been translated into German by Herr Rudolf Schick. "Angewandte Mechanik" is published by the firm of Teubner, of Leipzig and Berlin, at the price of 18 marks.

FOUR new volumes in the Philosophische Bibliothek published by the Dürr'schen Buchhandlung, Leipzig, have been received. No. 28 deals with Descartes's principles of philosophy, and is edited by Dr. A. Buchenau; some of the Emperor Julian's philosophical works, translated and explained by Herr R. Asmus, form No. 116; a critical analysis of Schleiermacher's "Weihnachtsfeier," by Herr H. Mulert, appears as No. 117; and No. 118 is an "Einführung in die Erkenntnistheorie," by Prof. A. Messer.

MESSRS. CHAPMAN AND HALL have published a third edition of Mr. Frederick Hovenden's book, "What is Life? or Where are we? What are we? Whence did we come? And whither do we go?" The first issue of the work was reviewed in NATURE for April 7, 1898 (vol. lvii., p. 535), and it is sufficient to say that the present edition has been revised in the light of the progress made since the publication of the last edition, and an appendix has been added.

THE Johns' Hopkins University Circular for December, 1908, takes the form of a memorial volume to the late President D. C. Gilman, first president of the Johns Hopkins University, who ruled its destinies from 1876 to 1901. The circular contains the impressive and appreciative addresses, delivered at the *in memoriam* services held last November at the University, by the present president, Dr. Ira Remsen, many of the University administrators and professors, and by Dr. James Bryce, our Ambassador at Washington. Numerous letters eulogising the late president received by President Remsen are included, an article from the *Nation*, and a biographical sketch.

#### OUR ASTRONOMICAL COLUMN.

WATER-VAPOUR LINES IN THE SUN-SPOT SPECTRUM.—In a paper read before the Dublin meeting of the British Association, and again in No. 5, vol. xxviii., of the *Astro-physical Journal*, Father Cortie directed attention to certain water-vapour lines in the solar spectrum which appear to become intensified in the spot spectrum. Examining ninety-one lines in the region  $D_1$  to  $\lambda$  5953.386, sixty-four, or 70.3 per cent., of which are due to water vapour, he found that of the sixty-four, twenty-nine, or 45 per cent., are affected in the spectrum of the spot either as widened or darkened lines. An examination of Hale's map showed that sixteen of these twenty-nine lines were also shown there as widened or darkened.

On this evidence Father Cortie suggested that steam may exist in the regions of sun-spots, and supported the suggestion by Mr. E. E. Brook's statement that he found the presence of water vapour essential for the laboratory production of Fowler's magnesium hydride bands, bands which are a prominent feature of the spot spectrum.